

What is Claimed is:

1. A method for identifying a peptide which binds to an anti-double stranded DNA antibody which comprises:

- 5 (a) contacting a peptide library composed of randomly generated peptide sequences with an anti-double stranded DNA antibody;
- (b) detecting the formation of a complex between said anti-double stranded DNA antibody and a peptide;
- (c) isolating and purifying said peptide; and
- 10 (d) sequencing said peptide.

2. The method of Claim 2, wherein said peptide library consists of decapeptides expressed on the minor coat protein of pIII.

15 3. A peptide identified by the method of Claim 1.

4. The peptide of Claim 3, wherein said peptide comprises D-amino acids.

20 5. The peptide of Claim 3, wherein said peptide comprises L-amino acids.

6. A peptide which binds to an anti-double stranded DNA antibody.

25 7. The peptide of Claim 6, wherein said peptide comprises D-amino acids.

8. The peptide of Claim 6, wherein said peptide comprises L-amino acids.

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9. The peptide of Claim 6, comprising the amino acid sequence X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art.

10. The peptide of Claim 6, comprising the amino acid sequence X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art.

11. The peptide of Claim 6, comprising the amino acid sequence X1-Trp-X1-Tyr-X2, wherein X1 is Asp or Glu, and X2 is Gly or Ser.

12. The peptide of Claim 6, comprising the amino acid sequence X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

13. The peptide of Claim 3 conjugated to a detectable marker.

14. The peptide of Claim 6 conjugated to a detectable marker.

15. The peptide of Claim 3 conjugated to a toxin.

16. The peptide of Claim 6 conjugated to a toxin.

17. A composition comprising a peptide which binds to an anti-double stranded DNA antibody.

18. The composition of Claim 17, comprising the amino acid sequence X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art.

19. The composition of Claim 17, comprising the amino acid sequence X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art.

20. The composition of Claim 17, comprising the amino acid sequence X1-Trp-X1-Tyr-X2; wherein X1 is Asp or Glu, and X2 is Gly or Ser.

21. The composition of Claim 17, comprising the amino acid sequence X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

22. A composition comprising two or more peptides each of which binds to an anti-double stranded DNA antibody.

23. The composition of Claim 22, wherein said peptides comprise the amino acid sequences selected from the group consisting of X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art; X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art; X1-Trp-X1-Tyr-X2, wherein X1 is Asp or Glu, and X2 is Gly or Ser; and X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

24. A method for detecting the presence of an anti-double stranded DNA antibody in a biological sample comprising the steps of contacting said biological sample with a peptide which binds to an anti-double stranded DNA antibody and detecting the formation of a complex between said peptide and said anti-double stranded DNA antibody.

25. The method of Claim 24, wherein said peptide comprises the amino acid sequence X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art.

26. The method of Claim 24, wherein said peptide comprises the amino acid sequence X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art.

27. The method of Claim 24, wherein said peptide comprises the amino acid sequence X1-Trp-X1-Tyr-X2, wherein X1 is Asp or Glu, and X2 is Gly or Ser.

5 28. The method of Claim 24, wherein said peptide comprises the amino acid sequence X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

29. A method for detecting the presence of an anti-double stranded DNA antibody in a biological sample comprising the steps of contacting said biological sample with two or more peptides each of which binds to an anti-double stranded DNA antibody and detecting the formation of a complex between said peptides and said anti-double stranded DNA antibody.

30. The method of Claim 29, wherein said peptides comprise the amino acid sequences selected from the group consisting of X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art; X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art; X1-Trp-X1-Tyr-X2, wherein X1 is Asp or Glu, and X2 is Gly or Ser; and X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

31. A method for diagnosing systemic lupus erythematosus in a subject suspected of having systemic lupus erythematosus comprising the steps of:

- (a) obtaining a biological sample from the subject;
- (b) contacting said biological sample with a peptide which binds to an anti-double stranded DNA antibody; and
- (c) detecting formation of a complex between said peptide and said anti-double stranded DNA antibody if present in said biological sample.

32. The method of Claim 31, wherein said peptide comprises the amino acid sequence X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art.

33. The method of Claim 31, wherein said peptide comprises the amino acid sequence X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art.

5 34. The method of Claim 31, wherein said peptide comprises the amino acid sequence X1-Trp-X1-Tyr-X2, wherein X1 is Asp or Glu, and X2 is Gly or Ser.

35. The method of Claim 31, wherein said peptide comprises the  
10 amino acid sequence X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

36. A method for diagnosing systemic lupus erythematosus in a subject suspected of having systemic lupus erythematosus comprising the steps of:

- 15 (a) obtaining a biological sample from the subject;  
(b) contacting said biological sample with two or more peptides each of which binds to an anti-double stranded DNA antibody; and  
(c) detecting formation of a complex between said peptides and said anti-double stranded DNA antibody if present in said biological sample.

20 37. The method of Claim 36, wherein said peptides comprise the amino acid sequences selected from the group consisting of X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art; X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art; X1-Trp-X1-Tyr-X2, wherein X1 is Asp or Glu, and X2 is Gly or Ser; and X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

25 38. A method for treating systemic lupus erythematosus in a subject in need of such treatment comprising administering to said subject a peptide which binds an anti-double stranded DNA antibody in an amount effective to treat systemic lupus erythematosus.

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39. The method of Claim 38, wherein said peptide comprises the amino acid sequence X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art.

5 40. The method of Claim 38, wherein said peptide comprises the amino acid sequence X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art.

10 41. The method of Claim 38, wherein said peptide comprises the amino acid sequence X1-Trp-X1-Tyr-X2, wherein X1 is Asp or Glu, and X2 is Gly or Ser.

15 42. The method of Claim 38, wherein said peptide comprises the amino acid sequence X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

20 43. A method for treating systemic lupus erythematosus in a subject in need of such treatment comprising administering to said subject two or more peptides each of which binds an anti-double stranded DNA antibody in an amount effective to treat systemic lupus erythematosus.

25 44. The method of Claim 43, wherein said peptides comprise the amino acid sequences selected from the group consisting X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art; X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art; X1-Trp-X1-Tyr-X2, wherein X1 is Asp or Glu, and X2 is Gly or Ser; and X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

30 45. A method for treating or preventing glomerulonephritis in a subject in need of such treatment comprising administering to said subject a peptide which binds an anti-double stranded DNA antibody in an amount effective to treat or prevent glomerulonephritis.

46. The method of Claim 45 wherein said peptide comprises D-amino acids.

47. The method of Claim 45, wherein said peptide comprises the amino acid sequence X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art.

48. The method of Claim 45, wherein said peptide comprises the amino acid sequence X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art.

49. The method of Claim 45, wherein said peptide comprises the amino acid sequence X1-Trp-X1-Tyr-X2, wherein X1 is Asp or Glu, and X2 is Gly or Ser.

50. The method of Claim 45, wherein said peptide comprises the amino acid sequence X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

51. A method for treating or preventing glomerulonephritis in a subject in need of such treatment comprising administering to said subject two or more peptides each of which binds an anti-double stranded DNA antibody in an amount effective to treat or prevent glomerulonephritis.

52. The method of Claim 51 wherein said peptides comprise D-amino acids.

53. The method of Claim 51, wherein said peptides comprise the amino acid sequences selected from the group consisting X-Gly-Trp-X-Arg-Val, wherein X is any amino acid known in the art; X-Trp-X-Tyr-His-X, wherein X is any amino acid known in the art; X1-Trp-X1-Tyr-X2, wherein X1 is Asp or Glu, and X2 is Gly or Ser; and X1-Gly-X1-Trp-Pro-Arg, wherein X1 is Asp or Glu.

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